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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,969	07/31/2003	David L. O'Meara	071469-0303535	1846
909	7590	02/01/2006	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN, LLP			LE, DUNG ANH	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	
			2818	

DATE MAILED: 02/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/630,969	<b>Applicant(s)</b> O'MEARA ET AL.	
	<b>Examiner</b> DUNG A. LE	<b>Art Unit</b> 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.  
     4a) Of the above claim(s) 32-54 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-31 is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

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## DETAILED ACTION

The previous office action has been withdrawn. This is a new ground of rejection.

### **Oath/Declaration**

The oath/declaration filed on 7/31/2003 is acceptable.

### **Election/Restriction**

Applicant's election **with traverse** of claims **1-31** is acknowledged.

Because Applicant did not distinctly and specifically point out the supposed error in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Applicants have the right to file a divisional, continuation or continuation-in-part application covering the subject matter of the non-elected claims 32-54.

The traversal is on the ground(s) that see the election paper. This is not found persuasive because the fields of search for method' and device claims are NOT coextensive and the determinations of patentability of method and device claims are different, that is process limitations and device limitations are given weight differently in determining the patentability of the claimed inventions. Also, the strategies for doing text searching of the device claims and method claims are different. Thus, separate searches are required.

The requirement is still deemed proper and is therefore made **FINAL**.

### **Information Disclosure Statement**

This office acknowledges of the following items from the Applicant:

Information Disclosure Statement (IDS) filed on 1/8/2004 and 4/22/2005 have been considered and made of record. The references cited on the PTOL 1449 form have been considered.

### **Specification**

The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### **Claim Rejections**

#### **Set of claims 1-16**

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty

defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1- 4, 6-8 and 10-16 are rejected under 35 USC 102 (e) as being anticipated by Ballantine et al. (6444592 B1).**

Ballantine et al. teach a method of forming a semiconductor microstructure, the method comprising:

positioning a substrate 10 in a process chamber [col 5, lines 45-50];

flowing a process gas comprising an oxygen-containing gas [col 5, lines 10-15] in the process chamber; and

forming an oxide layer 14 on the substrate, the layer being formed in a self-limiting oxidation process [col 6, lines 25-30], wherein the partial pressure of the oxygen-containing gas in the process chamber is less than about 50 Torr [col 5, line 35 or col 7, lines 20-25].

**Regarding claim 2**, wherein the thickness of the oxide layer 14 [col 5, lines 35] is less than about 15 Angstrom (A).

**Regarding claim 3**, wherein the thickness of the oxide layer [col 6, lines 60-23] is less than about 10 A.

**Regarding claim 4**, wherein the thickness uniformity of the oxide layer 14 varies less than about 1 Å over the substrate 14. [col 5, lines 35]

**Regarding claim 6**, wherein the partial pressure of the oxygen-containing gas is less than about 40 Torr (col 5, line 35).

**Regarding claim 7**, wherein the oxygen-containing gas comprises O<sub>2</sub> (col 5, line 12).

**Regarding claim 8**, wherein the process gas further comprises N<sub>2</sub> (col 5, line 12).

**Regarding claim 10**, wherein the process gas further comprises an inert gas (col 7, lines 9-11).

**Regarding claim 11**, wherein the inert gas comprises at least one of Ar, He, Ne, Kr, Xe, and N<sub>2</sub> (col 7, lines 9-11).

**Regarding claims 12 and 13**, wherein the substrate temperature is between about 500°C and about 1000°C and wherein the substrate temperature is about 700°C. (col 5, lines 37-42).

**Regarding claim 14**, wherein the substrate 10 comprises Si and the oxide layer 14 comprises SiO<sub>2</sub>.

**Regarding claims 15 and 16**, wherein the process chamber pressure is less than atmospheric pressure and wherein the process chamber pressure is less than about 50 Torr (col 7, lines 20-25).

### **Claim Rejections - 35 USC § 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 5 and 9 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Ballantine et al. in view of the following remark.**

**Regarding claim 5**, Ballantine et al. teach the claimed invention as applied to claim 1 except for the substrate diameter is greater than about 195 mm.

It would have been obvious to one having ordinary skill in the art at the time of the invention was made to form the substrate diameter is greater than about 195

mm., since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

**Regarding claim 9**, Ballantine et al. teach the claimed invention as applied to claims 1 and 7 including undisclosed mixing ratio (col 6, line 30), but fails to teach the N<sub>2</sub>:O<sub>2</sub> flow ratio is about 3:1.

However, it would have been obvious to one having ordinary skill in the art making semiconductor device to determine the workable or optimal value for the N<sub>2</sub>:O<sub>2</sub> flow ratio is about 3:1 through routine experimentation and optimization to optimal device performance.

#### **Reasons for Indication of Allowable Subject Matter**

**Claims 17-31 are allowed.** The following is a statement of reason for the indication of allowable subject matter:

Claims 17-31 are considered allowable since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations. Ballantine et al. (U.S. Patent No. 6444592 Background of Invention) and Background of Invention , taken individually or in combination, do not teach the claimed invention having the step of forming an oxide layer with high thickness uniformity, the oxide layer being formed between the initial dielectric layer and the substrate in



a self-limiting oxidation process, wherein the partial pressure of the oxygen-containing gas in the process chamber is less than about 50 Torr.

If Applicants are aware of better art than that which has been cited, they are required to call such to attention of the examiner.

When responding to the office action, Applicants' are advice to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.


A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (571) 272-1784. The examiner can normally be reached on Monday-Tuesday and Thursday 6:00am- 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The central fax phone numbers for the organization where this application or proceeding is assigned are (571)272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DUNG A. LE   
Primary Examiner  
Art Unit 2818